VARIATION IN SYNDESMON AND HEPATICA.

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Prof. Kellerman, in the OHIO NATURALIST for May, 1901, published an article on Variation in Syndesmon thalictroides (L) Hoffrug, based upon material from six Ohio localities, and at the time he called for additional notes from other places. I, therefore, venture to send to you the observations I have made upon this species in four other states compared with his, together with a similar study of Hepatica.

RUE ANEMONE, SYNDESMON THALICTROIDES.

From a study of the tables I–VII we may reach the following conclusions.

TABLE I—NUMBER OF FLOWERS PER STEM.

LOCALITY AND DATE.	N	1	2	3	4	5	6	7	8	9	10	Av.
Natick, Mass., May 6, '99	75			**70**	5							3.06
A Stony Brook,(RR) Mass., May 7,'99	83			**53**	25	5						3.41
B " " Mass., May 7,'99	13			**13**								3.00
E Yonkers, N. Y., Apr. 20, '99	46	0	0	**31**	15	0	0	0				3.32
A Yonkers, N. Y., Apr. 21, '99	38	0	1	**28**	9	0	0	0				3.21
Alpine, N. J., Apr. 23, '99	13	0	0	**10**	3	0	0	0				3.23
Toledo, Ohio	30	1	0	13	**15**	1						3.50
Steubenville, Ohio	17	0	0	7	**8**	2						3.70
W. Mansfield, Ohio	11	1	1	3	**6**	0						3.27
Rendville, Ohio	12	0	0	9	2	1						3.33
Columbus, Ohio	12	1	0	2	**8**	1						3.67
St. Marys, Ohio	18	0	0	**16**	2	0						3.11
A Riverside, Ill., May 12, '00	11	0	0	4	**7**	0	0	0				3.64
B Riverside, Ill., May 12, '00	66	0	0	**43**	20	1	0	1	0	0	1	3.49
Glencoe, Ill., May 5, '00	65	0	0	**52**	12	1	0	0				3.20
A Madison, Wis., May 2, '02	93	8	7	**59**	14	5	0	0				3.00
A " " May 12, '02	110	40	19	**38**	12	1	0	0				2.23
B " " May 25, '02	41	11	6	**13**	7	4	0	0				2.67
B " " June 10, '02	7	1	4	1	1	0	0	0				2.27
C " " May 25, '02	74	4	6	25	**29**	8	1	1				3.51
C " " June 10, '02	73	6	6	22	**28**	8	3	0				3.45
Total	908	73	50	512	228	38	4	2	0	0	1	3.15

1. The typical number of flowers is three—a terminal one and two lateral ones each in the axil of one of the involucrate leaves. One of these lateral flowers may be missing, but in case of reduction, both are more likely to disappear. Additional flowers may appear, generally as additional axillary flowers to the involucre, but in some cases, especially where there are many, in the axils of additional leaves above or below the involucre.

2. All the characteristics studied vary from place to place as determined, but since it also varies greatly from one grove to another in the same vicinity and from time to time, the amount of the variation which is truly geographical is difficult to determine.

TABLE II. NUMBER OF INVOLUCRATE LEAFLETS.

Locality and Date	N	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Av.	% petiolate leaves
Natick, Mass., May 6, 99	75		2	1	2	65	5										5.92	
A Stony Brook, Mass., May 7, '99	83				1	52	15	8	4	1	2						6.65	
B " " May 7, '99	13			1		12											5.84	
C Yonkers, N. Y., Apr. 19, '99	21					15	5	1									6.33	
E " " Apr. 20, '99	46					31	2	0	13								6.88	
A " " Apr. 21, '99	39				2	27	6	1	3								6.37	
Alpine, N. J., Apr. 23, '99	14					10	4										6.28	
Toledo, Ohio	30	2	1	4	1	8	10	0	3	1							6.09	90
St. Marys, Ohio	18	4	0	5	0	7	1	0	1								4.77	78
Steubenville, Ohio	17					7	6	2	1	1							7.00	0
W. Mansfield, Ohio	11	2	0	1	0	2	5	0	1								5.82	64
Rendville, Ohio	12					9	0	0	2	0	0	1					7.00	67
Columbus, Ohio	12	1	0	1	0	1	5	0	3	1							7.00	58
Glencoe, Ill., May 5, '00	65			8	1	44	9	1	2								5.97	
A Riverside, Ill., May 12, '00	11					4	6	1									6.73	
B " " May 12, '00	77	1	0	5	1	49	17	1	3								6.13	
A Madison, Wis., May 2, '02	103				21	66	14	2									5.97	7
A " " May 12, '02	110				2	93	12	1	1	1							6.17	32
B " " May 25, '02	41			1	0	28	6	4	1	1							6.44	24
B " " June 10, '02	7					5	1	1									6.39	43
C " " May 25, '02	74			1	0	32	23	8	4	5	0	0	0	1			7.03	17
C " " June 10, '02	74					25	27	5	7	6	1	2	0	0	0	1	7.47	16
Total	953	10	3	28	31	592	179	36	49	17	3	3	0	1	0	1	6.40	41.33

In the case of the Ohio localities it was necessary to count a leaf as three leaflets. This introduces a slight error in those cases as compared with the others.

3. The number of involucrate leaflets has maxima at 3, 6, 9, and 12, because of the trifoliate leaves. The maximum at 6 is by far the most frequent, corresponding to three flowers.

TABLE III. NUMBER OF SEPALS ON TERMINAL FLOWERS.

Locality and Date	N	4	5	6	7	8	9	10	11	12	Av.
Natick, Mass., May 6, '99	74		1	15	**51**	5	2				6.89
A Stony Brook, Mass., May 7, '99	67			13	**31**	16	7				7.24
B Stony Brook, Mass., May 7, '99	13			2	**11**						6.84
A Yonkers, N. Y., Apr. 17, '99	14			**5**	4	3	1	0	0	1	7.35
A " " Apr. 21, '99	37			7	**24**	4	2				7.02
C " " Apr. 19, '99	27			1	5	**18**	3				7.84
E " " Apr. 20, '99	49			1	16	**17**	10	4	1		8.06
Alpine, N. J., Apr. 23, '99	14			2	**10**	2					7.00
Glencoe, Ill., May 5, '00	64	1	3	**38**	20	2					6.29
A Riverside, Ill., May 12, '00	2				1	1					7.50
B " " May 12, '00	38		5	12	**12**	9					6.65
A Madison, Wis., May 2, '02	89		7	**48**	25	6	3				6.42
A " " May 12, '02	67		6	**40**	18	2	1				6.27
B " " May 25, '02	26	1	3	**12**	6	4					6.34
B " " June 10, '02	2			1	1						6.50
C " " May 25, '02	15			4	**6**	5					7.06
C " " June 10, '02	3		**2**		1						5.66
Total	601	2	27	201	242	94	29	4	1	1	6.85
Total all flowers	1241	30	256	520	298	100	29	6	1	1	6.24

TABLE IV. NUMBER OF SEPALS ON LATERAL FLOWERS.

Locality and Date	n	4	5	6	7	8	9	10	Av.
Natick, Mass., May 6, '99	18		4	**14**					5.77
A Stony Brook, Mass., May 7, '99	159		68	**70**	21				5.70
E Yonkers, N. Y., Apr. 20, '99	3				**3**				7.00
Glencoe, Ill., May 5, '00	24		7	**16**	1				5.74
A Riverside, Ill., May 12, '00	13	1	**8**	4					5.23
B " " May 12, '00	48	4	**27**	17					5.26
A Madison, Wis., May 2, '02	125		21	**80**	21	2	0	1	6.06
A " " May 12, 02	71	1	25	**42**	3				5.63
B " " May 25, '02	38	5	14	**16**	3				5.44
B " " June 10, '02	4		**2**	0	1	1			6.25
C " " May 25, '02	82	7	34	**40**	1				5.38
C " " June 10, '02	55	10	19	**20**	2	3	0	1	5.48
Total	640	28	229	**319**	56	6	0	2	5.67

TABLE V. NUMBER OF CARPELS ON TERMINAL FLOWERS.

Locality and Date	N	0	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Av.
Natick, Mass., May 6, '99	71			4	8	13	**15**	7	12	3	5	2	1	1																	7.55
A Stony Brook, Mass., May 7, '99	83			2	5	8	8	9	**12**	11	9	6	9	1	2	1															9.30
B Stony Brook, Mass., May 7, '99	13						1	0	**4**	3	1	2	1	0	0	1															10.54
C Yonkers, N. Y., Apr. 19, '99	22					2	1	2	2	1	5	**6**	1	0	2																10.58
E Yonkers, N. Y., Apr. 20, '99	42				1	1	3	3	3	5	2	**9**	4	5	4	2															11.35
A Yonkers, N. Y., Apr. 21, '99	28					4	**6**	4	**6**	1	3	2	0	2																	8.82
Alpine, N. J., Apr. 23, '99	14				**1**	1	4	0	**5**	2	0	0	1																		8.28
Glencoe, Ill., May 5, '00	65			1	1	3	4	6	6	7	6	**8**	4	4	3	4	2	3	1	1	1										11.54
A Riverside, Ill., May 12, '00	10							2	1	1	2	2	0	0	0	0	1	1													11.60
B " " May 12, '00	52		1	2	3	5	9	**9**	4	7	3	0	2	4	2	0	1														8.81
A Madison, Wis., May 2, '02	82					3	2	5	11	**16**	9	3	7	4	5	2	7	2	0	2	0	2	1	1							12.27
A " " May 12, '02	97	1			4	8	5	**15**	11	6	14	6	3	**7**	2	2	2	4	6	1											10.79
B " " May 25, '02	28					4	2	0	3	**4**	1	2	2	1	2	1	0	1	0	0	1	1	0	1	0	0	0	1	0	1	13.17
B " " June 10, '02	2												1				1														15.00
C " " May 25, '02	22				1	1	0	1	1	1	2	1	0	0	1	2	**3**	2	1	2	0	0	1	0	0	1	1				15.48
C " " June 10, '02	7	1	0	0	0	0	0	0	1	1	0	1	0	1	0	1	0	0	0	0	0	1									11.64
Total	638	2	1	9	24	53	60	64	**81**	69	62	50	36	30	23	16	17	13	8	6	2	4	2	2	0	1	1	1	0	1	10.55
Total all flowers	1220	6	2	16	45	110	133	149	**156**	123	108	96	69	66	34	32	25	16	10	8	3	4	2	3	0	1	1	1	0	1	10.11

TABLE VI. NUMBER OF CARPELS ON LATERAL FLOWERS.

Locality and Date	N	0	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	Av.
Natick, Mass., May 6, '99	18				2	**6**	5	1	2	1	1														7.10
A Stony Brook, Mass., May 7, '99	161	2	1	3	10	24	29	**35**	26	16	10	3	2												7.81
E Yonkers, N. Y., Apr. 20, '99	3									1			1	1											12.32
Glencoe, Ill., May 5, '00	25						2	5	3	**5**	1	3	2	2	1	1									10.52
A Riverside, Ill., May 12, '00	24			1	2	0	6	**7**	1	5	0	1	1										2		8.15
B " " May 12, '00	45			1	3	10	**11**	10	6	4															7.33
A Madison, Wis., May 2, '02	85					6	5	9	**14**	9	9	10	5	13	0	5									10.59
A " " May 12, '02	47			1	2	5	**10**	6	4	4	4	4	4	1	1	1									9.05
B " " May 25, '02	29			1	0	0	1	3	2	0	2	5	3	**6**	2	1	2	1							12.25
B " " June 10, '02	6										1	1	**2**	1	0	0	0	0	1						13.61
C " " May 25, '02	85	1	0	0	2	5	2	4	7	5	12	**12**	9	5	5	6	5	2	1	1	0	0	0	1	11.96
C " " June 10, '02	55	1	0	0	0	1	2	5	**10**	4	6	7	4	8	2	2	1	0	0	1	1				11.29
Total	583	4	1	7	21	57	73	**85**	75	54	46	46	33	37	11	16	8	3	2	2	1	0	0	1	9.64

4. The number of sepals and carpals is greater on the terminal flowers than on the lateral ones.

5. The number of carpals and sepals is greater according as the number of flowers on the plant is greater.

TABLE VII. CORRELATION OF POSITION AND NUMBER OF FLOWERS WITH NUMBER OF SEPALS AND CARPELS IN THE LOT FROM A. MADISON, MAY 2, 1902.

No. of Flowers on Plant	No. of Sepals				No. of Carpels			
	n	terminal	n	lateral	n	terminal	n	lateral
2	4	6.0	4	5.5	2	9.5	2	10.0
3	31	6.3	64	5.8	19	13.0	38	10.2
4	11	7.1	33	6.2	10	16.2	30	12.6
5	3	7.7	12	6.25	2	16.5	8	15.2
All plants	49	6.5	111	6.0	33	14.0	78	11.7

6. There are probably changes in the number of the several parts through the season, but the data is too conflicting to permit generalizations as to the direction of these changes in each case.

7. These results agree with those of Shull on Aster that place modes of floral parts cannot be used for geographical comparison without the most careful discrimination as to the other causes which affect the number of parts.

HEPATICA.

A study of Table VIII leads to the following conclusions:

1. Hepatica acuta (Pursh) Britton has a larger and more variable number of sepals than Hepatica Hepatica (L.) Karst.

2. The proportion of the individuals having flowers of the several colors differs greatly from one general locality to another and even from grove to grove in one locality.

3. There is no consistent correlation of appreciable magnitude between the number of flowers or number of sepals and the color of sepals.

4. The number of sepals per flower is regularly greater where the number of flowers per plant is greater.

5. The number of sepals has a skew variation towards increased number of sepals in conformity with most floral variation.

TABLE VIII. VARIATION OF HEPATICA.

Species	Locality	Date	Class	n	Plants with less than 4 flowers	Plants with more than 4 flowers	Number of Sepals									Lobes of leaves		
							5	6	7	8	9	10	11	12	Ave.	3	4	5
H. Hepatica	A Yonkers, N. Y.	Apr. 17, 99	blue	272	62	155	1	220	45	5	1				6.21			
"	"	"	pink	6	1	5	0	4	2	0	0				6.31			
"	"	"	white	16	7	9	0	8	7	1	0				6.56			
"	"	"	—4	58			0	53	5	0	0				6.07			
"	"	"	+4	77			1	59	14	1	2				6.23			
"	"	"	all	294			1	232	54	6	1				6.23	94	2	
"	C Yonkers, N. Y.	Apr. 19, 99	blue	28	6	17		20	7	0	1				6.35			
"	"	"	pink	112	44	50	2	97	12	1					6.10			
"	"	"	white	18	10	8		17	1						6.05			
"	"	"	—4	58				53	5						6.07			
"	"	"	+4	78			2	59	14	1	2				6.25			
"	"	"	all	158			2	134	20	1	1				6.14	126	1	
"	D Yonkers, N. Y.	Apr. 20, 99	blue	52	35	10		47	5						6.09			
"	"	"	pink	39	13	6		35	2	2					6.14			
"	"	"	white	14	1	7		8	4	1	1				6.64			
"	"	"2	—4	60				55	5						6.06			
"	"	"	+4	25				19	4	1	1				6.36			
"	"	"	all	105				90	11	3	1				6.19			
"	G Yonkers, N. Y.	Apr. 20, 99	blue	83	64	6	1	57	18	6	1				6.36			
"	"	"	yink	6	23	6		6	0	0	0				6.00			
"	"	"	white	37	6	0		26	9	1	1				6.37			
"	"	"	—4	92				69	19	3	1				6.26			
"	"	"	+4	12				1	8	2	0	1			7.33			
"	"	"	all	126			1	89	27	7	2				6.36	128	9	1
"	Winchester, Mass.	Apr. 23, 99	all	57				30	24	2	1				6.53			
H. acuta	Glencoe, Ill.	May 5, 00	blue	30				5	8	5	4	2	2	4	8.39			
"	"	"	pink	20				5	6	1	5	1	2		7.85			
"	"	"	white	47				13	9	8	8	7	1	1	7.84			
"	"	"	all	97				23	23	14	17	10	5	5	8.02			
H. Hepatica	all	several	all	7			4	575	136	19	6				6.25			